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ABSTRACT

Research often underestimates the vocabulary resources of the English language and, hence, the size of students' vocabularies and the rate of their vocabulary growth, by failing to take into account words that are not thought of as "general vocabulary," but that are essential to comprehension. These words include proper names, words with multiple meanings, idioms, and compounds and derivatives whose meanings are not fully predictable from the meanings of their parts. Research on vocabulary growth suggests that the average student learns from 2000 to 3000 words per year, and that many students learn at twice that rate. Although the likelihood of learning any particular word from context is relatively low, a moderate level of daily reading can lead to gains of several thousand words per year, a rate of learning beyond the reach of any vocabulary-building approach that attempts to cover words one at a time. A fundamental weakness of conventional approaches to vocabulary building is that they simply cannot cover a sufficient volume of words without exceeding reasonable limits on time. A second weakness lies in the limitations of definitions. Although definitions play an important role in most vocabulary instruction, educators tend to underestimate: (1) the difference between knowing a definition and knowing a word; (2) the shortcomings of many of the definitions found in glossaries and school dictionaries; and (3) the difficulty that students have interpreting definitions. Vocabulary instruction that promotes word consciousness, a sense of curiosity about word meanings, appreciation of nuances of meaning, independence in word analysis, and wide, regular reading appears to be superior to conventional instruction. (Author/RS)

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Abstract

Research has often underestimated the vocabulary resources of the English language and, hence, the size of students' vocabularies and the rate of their vocabulary growth, by failing to take into account words that would not typically be thought of as *general vocabulary*, but that are nevertheless essential to text comprehension. These words include proper names, words with multiple meanings, idioms, and compounds and derivatives (e.g., *shiftless*) whose meanings are not fully predictable from the meanings of their parts. A synthesis of research on vocabulary growth suggests that the average student learns from 2,000 to 3,000 words per year, and that many students learn at twice that rate. Even an average rate of vocabulary growth is possible only if students learn large numbers of words incidentally, as they are exposed to new words while reading. Although the likelihood of learning any particular word from context is relatively low, a moderate level of daily reading can lead to gains of several thousand words per year, a rate of learning beyond the reach of any vocabulary-building approach that attempts to cover words one at a time. A fundamental weakness of conventional approaches to vocabulary building, then, is that they simply cannot cover a sufficient volume of words without exceeding reasonable limits on time. A second weakness of conventional approaches to vocabulary instruction lies in the limitations of definitions. Although definitions play an important role in most vocabulary instruction, educators tend seriously to underestimate (a) the difference between knowing a definition and knowing a word, (b) the shortcomings of many of the definitions found in glossaries and school dictionaries, and (c) the difficulty that students have interpreting definitions. Vocabulary instruction that promotes word consciousness, a sense of curiosity about word meanings, appreciation of nuances of meaning, independence in word analysis, and wide, regular reading appears to be superior to conventional instruction.

THE VOCABULARY CONUNDRUM

Every experienced teacher is aware that students who don't know many words are unlikely to be good readers or good students. Squaring with teachers' experience, one of the most consistent findings of educational research is that having a small vocabulary portends poor school performance and, conversely, that having a large vocabulary is associated with school success. Vocabulary knowledge is very highly correlated with scores on standardized achievement tests, and so highly correlated with IQ test scores that a wide-range vocabulary test can be used in place of a full IQ test. Moreover, some measure of vocabulary difficulty is always the major component of readability formulas used to grade the difficulty of textbooks; it will not surprise teachers to hear that research demonstrates that difficult textbooks contain more hard words than easy textbooks.

Naturally, teachers have searched for ways to help students improve their vocabularies, with the hope of increasing their reading comprehension and chances of school success. Championed by such figures as the late Edgar Dale of Ohio State University, vocabulary-building programs have been a fixture in American classrooms from the 1920s onward. They are still in evidence today, although interest in them may have waned, perhaps because of the rise of the whole language movement, or maybe because of the lack of visible champions such as Dale.

In this report, we take a fresh look at vocabulary growth and development, taking a close look at conventional vocabulary instruction, and asking: Where and how do successful students learn the words they know? Can vocabulary-building programs make a significant contribution to the growth of word knowledge? What would a sensible agenda to promote vocabulary growth look like?

How Vocabulary Has Been Dealt With in the Schools

Virtually every teacher pays some attention to vocabulary, introducing the new words in reading lessons, or the technical vocabulary in science or social studies lessons. Beyond this, many teachers have a separate program to build vocabulary. In a typical vocabulary-building program, students are expected to master 20 words a week. The standard approach is for students to study definitions of the words, compose sentences using the words, and on Friday take a test. In the elementary school, children learn to spell the words as well as learning their meanings; in fact, the program may be called spelling. Vocabulary-building programs usually involve lessons on using a dictionary, analyzing word parts, and marshalling context clues to figure out word meanings while reading. Regrettably, there is accumulating evidence that vocabulary-building programs do not work very well. In the next sections, we consider some of the reasons why this is so.

Dimensions of the Vocabulary Learning Task

To know what to do about vocabulary, you need some basic information about the size of the task students face. If the average high school senior knows 8,000 words, as some people have claimed, then all you have to do is teach 20 words a week for 12 years, and you can cover all of them. But if the average high school senior knows 40,000 words, as other people maintain, you would have to teach 20 words a day to cover them, a much more formidable task. Clearly, if high school seniors know anywhere close to 40,000 words, you can be sure that they didn't learn very many of them in vocabulary lessons, or by looking them up in the dictionary.

Hard facts about the size of the vocabulary-learning task that young people face have proved surprisingly elusive. The problem has been variation in the procedures used by vocabulary researchers. Generally, what researchers do to estimate vocabulary size is select a source of words, usually a dictionary, that is taken to be representative of the English language; define criteria for selecting a sample of words from

this source; devise a test to assess knowledge of the sample of words; give the test to a representative sample of children; and extrapolate the results to all words and all children.

Errors of estimation can arise at any of these steps. Major swings in the size of estimates hinge on the word source. It should be plain that a researcher who selects words from a pocket dictionary will conclude that the size of the vocabulary-learning task is smaller than will the researcher who selects words from an unabridged dictionary. Those who support the use of small dictionaries say that large dictionaries are filled with archaic, technical, foreign, and extremely rare words. Those who defend the use of large dictionaries counter that a large dictionary contains many useful words, known by literate people, that are not in smaller dictionaries, and that, in any event, the use of a small dictionary begs the question of the size of the task of learning the vocabulary of English.

The second major source of variability in estimates stems from the criteria for what counts as a distinct word in English. Everyone agrees that, for instance, *walk, walks, walked,* and *walking* should not be counted as separate words, because even a preschooler who knows one of these variants will know them all. Beyond simple inflections, however, there has been a lot of controversy about how closely related in form and meaning different items have to be to be considered as instances of functionally the same word. Some scholars take an etymological approach to the relationships among words, positing relationships based on the history of language use. For example, they group *business* with *busy* and *however* with *how*. When you collapse distinctions among words, the vocabulary-learning task seems smaller and perhaps more manageable. The question that must be raised, however, is the extent to which present-day readers can make use of historical relationships.

We have completed a program of research designed to resolve questions about the dimensions of the vocabulary-learning task. First of all, we finessed the issue of whether to base our study on a large or a small dictionary. Instead of either, we employed a corpus of over 5,000,000 running words from 1,000 items of published materials in use in schools. These materials included textbooks, workbooks, kits, novels, general nonfiction, encyclopedias, and magazines chosen to represent, as nearly as possible, the range of required and recommended school reading. We did not mark words as technical, archaic, rare, and so on. There was no need to. We were already dealing with words that are actually part of school English.

We took the position that children reading English today will often not know, or be able to use, information based on the history of the words they encounter. Thus, we analyzed relatedness among words, not in terms of their historical derivations, but in terms of the similarity of their current meanings. We judged pairs of words, attempting to decide whether a student who knew the meaning of only one of the words would be able to infer the meaning of the other word upon encountering it in context. We judged, for example, that most students who knew *clever* would be able to get *cleverness*, but that knowing *busy* would usually be insufficient to get *business*. Compound words were judged in a similar fashion. For example, with just a little help from context, a reader could infer *foglights* if she knew *fog* and *light*, but knowing *dash* and *board* would be of almost no help to her in inducing *dashboard* if she did not already know that compound.

Based on a thorough analysis of a large sample of words from the corpus, we calculated that there are about 88,500 distinct words in printed school English. Our next step was to recalibrate previous estimates of the number of words known by students in different grades, using benchmarks from the corpus that we had analyzed in depth. When we used a common definition of a distinct word in English, most of the variability in estimates of students' vocabulary size disappeared, and we were able to reach the conclusion that the average high school senior may well know about 40,000 words and that the average student in elementary school or high school probably learns 2,000 to 3,000 new words each year. While the foregoing estimates are now accepted as at least approximately right by most vocabulary authorities, we must acknowledge that the numbers are still contested by a few. The dispute that still

remains centers on the issues already raised--whether to include certain classes of words, such as technical terms and words that are regarded as too rare to be worth bothering with, and the extent to which readers are able to use the information in derivative and compound words.

We believe that the criteria we employed are linguistically, psychologically, and educationally defensible, but we certainly do not wish to set ourselves up as the final arbiters of what counts as a word. Teachers should make up their own minds. The issue with respect to whether to exclude certain classes of words from consideration is whether students will run in to any of these words in material they are expected to read or want to read. Consider *artery, electron*, and *statute*. Are these words so specialized that they appear only in physiology, physics, and law treatises? Are there no elementary and high school students who know any of these words? If you are inclined to say that these are exotic words that only specialists know, then shade our estimates downward.

The second issue is the extent to which students will be able to transfer the understanding they have of base words to unlock the meanings of unfamiliar derivatives and compounds. In many cases transfer is easy; in many other cases transfer is impossible. In between are numerous borderline cases where success in figuring out the meanings will depend on the linguistic sophistication and motivation of the student. Examples of easy cases are *colorless* and *washcloth*. In between are such words as *restless* and *handspring*. Examples of impossible cases are *shiftless* and *foxtrot*. Remember, the question is, can you get the meaning of the whole from the meanings of the parts? For instance, suppose you had never seen or heard *shiftless* before. Would you know its meaning because you know the meanings of *shift* and *-less*? If you say yes, revise our figure downward.

The estimate that there are 88,500 distinct words in English is an order of magnitude larger than the number assumed by proponents of vocabulary-building programs. Yet, we have recently come to the conclusion that the number is too small. It does not include any proper words, although knowledge of many proper words is assumed by both fiction and nonfiction writers. Writers may not stop to explain the meaning of *Methodist, Amazon, Republican, Egypt,* or *Platonic*.

Nor does the number include multiple meanings of words, although knowing one meaning of a word is more likely to be a hindrance than a help in recognizing another meaning. For instance, knowing *bear* in the sense of a large mammal does not help a reader understand *to bear a heavy burden* or *to bear a child.*

How much does it add to an estimate of the number of words in the language if you distinguish words by meaning and not just by spelling? It depends on the criteria you use for counting two meanings as distinct. The number of distinct meanings in a dictionary serves as a starting point, but dictionaries can easily be accused of hair-splitting when it comes to counting how many meanings a word has. We found an average of four meanings per word listed in a school dictionary; a larger dictionary would have certainly yielded a larger number. However, many of the meanings listed reflect rather subtle distinctions. For example, among the meanings for *gain* were "to develop or acquire gradually," as in *he gained strength*, and "to come to have," as in *he gained a bad reputation*. When we attempted to count truly distinct meanings--meanings so different that one would not immediately see any relationship between them--we found there to be, on the average, about one and a third meanings per word. We could consider this figure a reasonably conservative estimate; however, it obscures the fact that the most frequent words in the language tend to have large numbers of meanings, whereas less frequent words tend to have fewer.

The largest category previously excluded from our estimates are idioms. We are using the term *idiom* in the most general sense, to cover any expression made up of two or more words, whose meaning is not predictable from the meanings of its parts. This definition covers a broad range of expressions beyond just colloquial expressions such as *kick the bucket*, which the term *idiom* may suggest. It also

covers stock phrases such as *make yourself at home*, technical terms such as *standard deviation*, and the ubiquitous compound verbs such as *put out* (as in *put out the fire*), *put up* (as in *put up the money*), and *put up with*.

Normal language is full of these prefabricated units. Most native speakers use and understand idioms without being fully aware of their frequency, or the fact that their meanings are more than, or different from, the sums of their parts. *Take your chances* and *make yourself at home* may sound like perfectly regular, literal phrases, until you realize that *take your risks* and *make yourself at house*, although presumably similar in meaning, do not sound like normal English. Some idioms, such as *by and large*, are completely unanalyzable. Of course, the parts do contribute something to the meanings of many idioms. For instance, to *take someone under one's wing* is, roughly, to take someone under one's care or protection. It might be said, then, that only the word *wing* has a figurative meaning in this phrase, although it is not a meaning that *wing* takes in many other contexts. But the general point is that an unknown idiom complicates the task of reading in just the same way as an unknown word. Thus, a complete and accurate assessment of the size of the vocabulary of English would have to take account of the number of idioms in the language, including the substantial number of idioms among proper names--names such as the *Grand Banks, Martha's Vineyard, Pony Express*, and the *Round Table*.

Considering all of these categories, how many distinct vocabulary items does English contain? By "distinct vocabulary item," we mean to include (a) basic words, that is, words that are not further analyzable (such as *straight*); (b) semantically opaque derivatives and compounds, that is, words that are sufficiently different in meaning from the related basic words that a typical student who did not know them would be unable to figure them out from the parts (*shiftless, copperhead*); (c) multiple meanings of words, for example, the several meanings of *bank*--a financial institution, the side of a river, to tilt and turn an airplane; (d) proper words whose meanings would ordinarily be assumed in a text (*Methodist*); and (d) idioms, that is, expressions whose meanings are not entirely predictable from the meanings of the parts (*put up with*).

There is limited research on how many derivatives and compounds students know and basically no research on how many proper words, multiple meanings of homonyms, and idioms they know. But there can be no doubt that they know thousands of items in these categories. Therefore, estimates of how many vocabulary items students of different ages know will certainly have to be revised upward. Just how far upward must await careful empirical research. In the meantime, we venture the guesstimate that there may be 180,000 distinct vocabulary items in school English, and that an average high school senior may know 80,000 of them.

In 1984, we concluded that "any program of direct vocabulary instruction ought to be conceived in full recognition that it can cover only a small fraction of the words that children need to know. Trying to expand children's vocabularies by teaching them words one by one, ten by ten, or even hundred by hundred would appear to be an exercise in futility" (Nagy & Anderson, p. 328). This conclusion seems to us to have even more force today.

Weaknesses of Definition-Based Vocabulary Instruction

Almost all classroom vocabulary activities involve definitions in some way. Students are told definitions of new words or they look them up in the dictionary. They memorize definitions or produce definitions during discussion. To some extent, the reliance on definitions is unavoidable. Nevertheless, it is important to realize how inadequate definitions are as the foundation for vocabulary instruction. The unthinking assumption is that knowing a definition is the same thing as knowing a word meaning. Many of the shortcomings of conventional vocabulary instruction can be traced to this assumption. That knowing the definition of a word is *not* the same thing as knowing the meaning is a matter of simple

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logic in the last analysis, because definitions define words using other words. Eventually the circle of words must be broken if meanings are to connect with actions, objects, thoughts, and feelings.

If knowing the definition of a word were the same as knowing its meaning, then when you encounter a familiar word its definition should spring immediately to mind. We invite you to see whether the definitions of, say, *embarrass* and *if* come readily to your mind. You will probably find that it is quite a struggle to formulate definitions of these words, despite the fact that you know them both well.

Conversely, you can apprehend a definition without knowing the word. This is harder to demonstrate, simply because genuine examples would have to be words you don't know. However, the point can be illustrated approximately with definitions of words you do know. Try to figure out the words that go with these actual dictionary definitions: (a) the ability to do, act, or produce; (b) any perceptible mark left by a past person, thing, or event; (c) suitable to a purpose; (d) happening as a result of or in connection with something more important. The words are listed at the end of this article. You know each of these words, but it certainly will take some work for you to come up with them, and a couple of the definitions may stump you. This should not happen if knowing a definition and knowing a word meaning were one and the same.

Rather than assuming that knowing a word's meaning and knowing its definition are the same, we make the following assertion: *You don't know a new word until you no longer think of the definition when you read it.* When you really know a word, its meaning comes to mind within a quarter second after your eyes land on it. When you really know a word, you know much more than is found in any definition--connotations, how to use it, different shades of meaning depending on the context.

Our estimates of the annual rate of vocabulary growth suggest that students are incredibly adept at word learning. On the other hand, using traditional methods of vocabulary building to teach vocabulary may sometimes feel like trying to drive nails into concrete. We believe that this tells us more about the inadequacy of definition-based vocabulary instruction than about children's potential as word-learners.

In fact, research paints a dismal picture of definition-based instruction. Definition-based instruction does not reliably produce the ability to use a word correctly, nor does it consistently increase comprehension of text containing the instructed words. When you give students definitions of unfamiliar words and ask them to write sentences, they frequently reveal amazing misconceptions. Given the definition of *meticulous* as "very careful or too particular about small details," one student wrote, "I was meticulous about falling off the cliff." Another student read the definition of *correlate*, "to be related one to the other," and wrote the sentence, "Me and my parents correlate, because without them I wouldn't be here."

Dictionaries are designed as reference works, not teaching aids, and the practical consideration of length limits their informativeness. The need to be brief pushes writers of definitions to use very sophisticated language. Definitions are ordinarily shortened by using abstract nouns, which allows stating a predicate without specifying the arguments. For example, the glossary in a widely used basal reader defines *habits* as "usual behavior" rather than "what a person or animal usually does." Although the abstract wording saves space, it diminishes the instructional value of definitions. The conventions for writing definitions are likely to be unfathomable to many younger and less able learners, the very ones most in need of help with word meanings.

A further complexity is that many words have multiple meanings. Words may have wholly distinct senses, as do a couple of examples already cited, *bear* and *bank*, or they may have slightly different senses that overlap in meaning. An example of the latter type is *give*. According to Webster's New Third International Dictionary, the primary meaning of *give* is "to confer ownership of something without receiving a return." This definition works just fine with *Mary gave John a present*, but already there is

a problem with *Mary gave John $10 and he gave her $2.57 change*. The definition does not cope with the fact that "receiving a return" of goods or services, as well as a return of change, is expected in this context. The problem is even more acute in *Mary gave John a kiss*. *Give* seems to be used here in a perfectly ordinary way, but does one really want to mean that Mary "conferred ownership" of a kiss? The manifold complexity of the meaning of *give* does not end here. Compare its use in *Mary gave John permission* and *Mary gave John a shove*. If the meaning of *give* were exactly the same in these uses, you could substitute the same synonym in each sentence and preserve the meaning. However, you can say *grant John permission*, but it would be weird to say *grant John a shove*. Whatever this may mean, it does not mean to give him a shove, at least not in the same sense of *give*.

Give is a typical, not an exceptional word. Most words in ordinary use have multiple shades of meaning depending upon the context. Large dictionaries try to accommodate multiple meanings by having a different subentry for each distinguishable sense of a word. In one of its two main entries for *give*, Webster's starts with "to confer ownership. . ." and follows with no less than 55 other subentries in 14 major groupings, as well as a number of idioms. An entry in a large dictionary can be an impenetrable thicket for the less able student. School dictionaries and glossaries try to accommodate multiple meanings through simplification, we dare say oversimplification, presenting one or a few senses of words with multiple meanings. Now the student's mystery can be how to fit an over-general definition with an actual encounter with a word, how to understand, for instance, what it could mean "to confer ownership" of a kiss.

It is important to distinguish unfamiliar words that are new labels for already known concepts from unfamiliar words that represent new concepts. The former often *can* be learned from simply reading definitions. For example, it seems likely that most students in the middle grades and beyond would be able to grasp the meaning of *tow* from the definition "to pull something behind you." However, as soon as a word meaning contains any subtle conceptual content, it becomes increasingly problematical that a student will get the meaning from simply reading a definition, as students' mistakes with words such as *meticulous* and *correlate* illustrate.

Often you need to understand a whole network of concepts to grasp the meaning of a word. An example from ordinary life is the word *cousin*. A child has to know a lot about kinship relations in order to truly appreciate what a cousin is. The same is true of most technical vocabulary. For example, to learn anything from the definition of a *standard deviation* as "the square root of the arithmetic average of the squares of the deviations from the mean in a frequency distribution," you must possess some other knowledge about statistics.

Have we overstated the problems with definitions? Some teachers may think so, but consider the possibility that they may have skewed information about how well definitions are working. The words that are included in exercises on how to use the dictionary are set up to be easy. For instance, the words may be ones that students already know. A student can seem quite erudite explaining the definition of a known word. Multiple-choice tests presenting definitions students have memorized may not reveal misunderstandings. Thus, we feel that some teachers may have been lulled into false optimism about the efficacy of definitions.

So, what should be done? First of all, school dictionaries and glossaries should be improved. There is just no excuse for a dictionary for children to define *furious* as "full of fury or wild rage" when it could say "very, very angry." Research shows that careful rewriting of definitions does enhance student understanding. In one study, fifth graders were given definitions from widely used school dictionaries, and asked to use the words in sentences. An astonishing 82% of the sentences were unacceptable. Then, the definitions were painstakingly rewritten and given to another group of fifth graders. The rate of unacceptable sentences went down to 50%. While this is an improvement well worth the trouble, notice that students were still confused half of the time.

Second, we must do a better job of teaching students how to use the dictionary. The typical program does a satisfactory job explaining guide words and helping students locate words in the dictionary. But once a word is located, instruction peters out and the student is on his own in figuring out the definition. Instruction has to go deeper if we want students to be able to choose among multiple meanings or understand words that entail new concepts.

Third, we must honor the dictum that a dictionary is a reference work. It is meant to be used by a reader to help with unknown words in an otherwise meaningful text, or by a writer who knows full well what she is trying to say. For these purposes, a good dictionary is a valuable tool. But, a dictionary is not designed to be a stand-alone source of meanings for words that are isolated from a comprehensible context, and it serves this purpose poorly. Therefore, we must abandon the belief in contextless vocabulary building programs in which students try to memorize the definitions of lists of unrelated words.

Natural Learning of Word Meanings While Reading

Up to this point, we have summarized evidence that word-list drill is a dubious means for promoting vocabulary growth and that, in any event, growth in knowledge of word meanings is too rapid for direct vocabulary-building programs to be making much of a contribution. The best available estimate is that children learn 2,000 or 3,000 new words a year throughout the school years, or perhaps even as many as 4,000 to 6,000 if proper words, multiple meanings, and idioms are included. Yet, research suggests that in the typical classroom, direct instruction is provided on only about 300 words during the course of a school year, and of these perhaps 200 are learned well enough for students to check correct answers on a multiple-choice test.

For a long time, the strongest reason for believing that most vocabulary is picked up while reading was a "default argument." That is, if students are learning several thousand words a year, and they are only learning a few hundred from any sort of explicit vocabulary instruction, where else could they be learning all these words?

Strictly speaking, it would be very difficult to prove that most vocabulary growth came naturally through reading, because it is next to impossible to assess how many words students learn from oral language. However, there is evidence that a substantial amount of students' vocabulary growth probably comes through reading.

In a series of studies on natural learning of word meanings, we have proved that students of all ages and ability levels do learn new words as the simple, incidental byproduct of reading. We have ascertained that the overall probability that a student will learn a previously unfamiliar word while reading is about 1 in 20. This figure is averaged over a number of different kinds of texts. The probability of learning an unfamiliar word from a narrative text matched to the reader's level of comprehension is at perhaps twice as high. Conversely, when the text is a difficult exposition, the likelihood of learning an unfamiliar word is close to zero.

How easily a new word is learned from context is, in part, a function of its conceptual difficulty. That is, it is easier to learn a word like *apologize* from context (assuming that you already understand the concept of saying you are sorry), than it is to learn a word like *mitosis*, (assuming that when you try to learn this word, you do not already have a grasp of the process of cell division). How easily a new word is learned from context also depends on the informativeness of the context, and the number of times the word is encountered. Our 1-in-20 figure holds for a single encounter; the likelihood of learn a word increases as it is seen more often.

To be sure, the chance of learning any particular word while reading is much lower than the chance of learning the same word through direct vocabulary instruction. Thus, if the goal is to help a student learn the meaning of some particular word, waiting for the student to encounter it while reading, hoping that this will be the 1 word in 20 actually learned, would be a long shot.

However, the apparently low rate of natural word learning must be viewed in terms of its cumulative effects given even modest amounts of daily reading. It has been estimated that if all categories of reading are included, the median fifth grader spends somewhere around 25 minutes a day actually reading. This number is certainly lower than would be desired, but it translates into about a million words of text covered in a year. Assuming that at least 2% of the words this fifth grader reads are unfamiliar (a conservative assumption), that amounts to 20,000 new words. If 1 in 20 of these is learned, we have accounted for at least 1,000 words a year, a sizable fraction of the average child's annual vocabulary growth. An avid reader might spend an hour or two a day reading, and thus cover four or more times as much text. The rate of learning from context for self-selected text is likely to be closer to 1 unfamiliar word in 10 than 1 in 20. For children who do a fair amount of independent reading, then, natural learning could easily lead to the acquisition of 5,000 to 10,000 words a year, and thus account for the bulk of their annual vocabulary growth.

Even smaller amounts of reading can provide valuable encounters with unfamiliar words. Research has shown that children who read 10 minutes a day outside of school experience substantially higher rates of vocabulary growth between second and fifth grades than children who do little or no reading.

Vocabulary Instruction Reconsidered

Are we about to reach the conclusion that all vocabulary instruction is fruitless, or even harmful? No, we are not. But, we do urge a shift in perspective, away from a preoccupation with the number of words that you force students to cover. We believe that the goal of instruction should be to develop what one lexiphile has termed *word consciousness*. Encounters with words should be playful, so as to provoke curiosity and an interest in word study. Figuring out an unknown word should be treated as an exercise in problem solving, so as to promote independence in word analysis.

Word consciousness is a concept that includes understanding how the parts of words contribute to their meanings. Even the youngest students understand the function of *-s* and *ed*. A functional understanding of derivational suffixes such as *-tion* and *-ly* develops later. By the time they have reached the fourth or fifth grade, good readers are aggressive in using the information in word parts to try to figure out words while they are reading. The knowledge and the disposition to use word parts is slower to develop among less able readers, and no doubt skillful instruction could help speed development. What we have in mind are lessons in which students explore the relationships in families such *act, react, action, reaction, actor, actress, active, inactive, radioactive*, and *hyperactive*.

Vocabulary instruction that aims to develop a deep understanding and appreciation for words must seize teachable moments. Try to reconstruct what went through your mind when you encountered the word *lexiphile* in the first paragraph in this section. Many readers, if they are honest, probably stumbled momentarily and then read on without ever clearly formulating a meaning for the term. Anyone who looked for the word in a dictionary was frustrated, because it is a word we made up. Readers who are disposed to treat an unknown word as an interesting puzzle may have paused to notice that *-phile* is a part of *Francophile*, which they know means a person fond of things French, or *bibliophile*, a book lover. These readers may also have noticed that *lexi-* appears in *lexicon* and *lexicographer*, and must have something to do with words. With a little help from the context, they may thereby discover that *lexiphile* probably means a person fascinated by words.

So, to heighten word consciousness, be on the lookout for interesting, complex words in the books your students are reading. Occasionally challenge them to formulate hypotheses about the meanings of these words from what they know of the parts and what they can infer from the context. We invented *lexiphile* to challenge adults. An example of a word that may be at the right level of challenge for middle grade student is *geographer*. Literally rendered, *geographer* means "a person who draws the earth" or map maker. For a younger student, *Thanksgiving* may provoke insight; many young children have failed to notice that *Thanksgiving* has anything to do with giving thanks.

Word parts seldom completely determine the meanings of words. Seeing the *radio* in *radioactive* helps a lot with pronunciation, but is likely to mislead about meaning, conjuring up images of boom boxes operating at full blast, unless one remembers the less obvious relationships of *radio, radiate,* and *radiation*. The key to using word parts successfully is flexibility, and always taking care to triangulate information from word parts with the context and what you already know about the topic. You need to respect hypotheses offered by students that are inventive if not entirely accurate, but keep bringing them back to the main issue: Does this interpretation of the word make sense in this context based on everything you know?

Another important facet of word consciousness is sensitivity to nuance of meaning. The student who reads that a character swaggers into a room, and gets only that he came into the room, is missing a lot. Students can learn much about nuance of meaning from examining and attempting to express the differences in meaning among related words. For instance, consider *see, look, glance*, and *glimpse*. What distinction does *look* convey that is not conveyed by *see*? One answer is that looking is a deliberate act of seeing. Now, compare *see* and *glimpse*. The difference is that to glimpse is to see for a short time. Next, compare *glance* with the other three words. It falls neatly into place, sharing the feature of deliberateness with *look* and the feature of shortness with *glimpse*. At this point, depending upon the age and sophistication of your students, you can enrich the discussion by considering other verbs of visual perception such as *examine, stare, ogle,* and *gawk*.

How should the technical vocabulary of the sciences and the social sciences be approached? When reading gets difficult, unfamiliar words are the first obstacle to comprehension mentioned by most students and many teachers. But the problem is not so much one of unfamiliar words as it is of unfamiliar concepts. Thus, to be successful, teaching must honor the primacy of concepts. Students must be helped to construct complex, unfamiliar concepts from simpler concepts they already know. The teacher's and the book's explanations must be clear and complete. Because concepts come in clusters, or interacting systems, the interrelationships need to be illuminated with analogies, diagrams, or physical models. The teacher needs to be alert for gaps in understanding, and the possibility that a student may concoct a totally different theory to link concepts together. Every topic should be approached in a spirit of inquiry. Skillful teachers will arrange for students to make at least some small discoveries on their own. When a domain is at all complex, covering it once will not be enough. Students need to criss-cross the domain again and again, until they can explain concepts in their own words, solve fresh problems, and apply principles to new situations.

Whereas concepts are primary, the surface form of words is one source of difficulty for the novice. A long, unfamiliar word can be difficult to pronounce, hard to remember, and may seem to have an arbitrary association with the concept it represents. Although technical vocabulary may seem strange at first, the truth is that most technical terms wear their meanings on their sleeves. Most have Greek or Latin roots. When students learn this principle and master even a small number of specific roots, technical terms can actually become aids to learning and memory. Consider *photosynthesis*. It consists of *photo*, meaning "light" (not "picture of me in the yearbook") and *synthesis*, which means "a putting together." Thus, photosynthesis is a process that involves putting things together using light. Occasionally pausing to reflect about the meanings of technical terms will help to make them the friends, rather than the enemies of comprehension. In general, we

endorse approaching technical terms in the same reasoned, logical spirit that ought to pervade all subject matter instruction.

Our conclusion is that the best way to foster vocabulary growth is to promote wide reading. Time spent in reading will lead to gains in fluency, in knowledge, in familiarity with written language, and in appreciation of literary genres, as well as vocabulary growth. A comparable amount of time spent in a traditional vocabulary-building program, whatever word knowledge it produces, has none of these benefits. In place of vocabulary-building programs, we advocate vocabulary instruction that promotes word consciousness, a sense of curiosity about word meanings, appreciation of nuances of meaning, and independence in word analysis.

Words for the dictionary definitions given on page 6:

(a) power (b) trace (c) good (d) incidental

Reference

Nagy, W. E., & Anderson, R. C. (1984). How many words are there in printed school English? *Reading Research Quarterly, 19*, 304-330.

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